

# STABLE ISOTOPE ANALYSIS REVEALS A NEW ZEALAND ALPINE BEETLE'S LICHEN DIET

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## Study Description

*Protodendrophagus antipodes* beetles and their larvae live at high elevation in rock outcrops on mountains along New Zealand's Southern Alps. Living above the tree line, they require a different diet from their forest-dwelling relatives that feed on fungi under loose bark. Stable isotope analysis of potential food sources revealed that the probable diet for *P. antipodes* was either, or both, of two species of ammonia-absorbing lichens; one crustose and one fruticose species. The lichen diet is possibly unique among the family Silvanidae and is surprisingly rare globally among the hyper-diverse beetle fauna.

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Photo 1. A larva of *Protodendrophagus antipodes* on the crustose lichen, *Rhizocarpon geographicum*. This lichen was identified as one of two lichen species on which *P. antipodes* probably feeds. Photo credit: John Marris.





Photo 2. An adult *Protodendrophagus antipodes*. Both the adult and larval stages of *P. antipodes* live in narrow crevices in lichen-encrusted rock outcrops. Photo credit: John Marris.





Photo 3. A rock outcrop on Mount Hutt ski field used as one of the sample sites for the study. The outcrop is at 1,723 m elevation and is surrounded by bare rock scree. The tree line lies several hundred meters below on the lower slopes of the mountain. Photo credit: John Marris.





Photo 4. Co-author, John Marris searching for *Protodendrophagus antipodes* specimens in typical habitat in the Sealy Range, Aoraki/Mt Cook National Park. Photo credit: Sophie Marris.





Photo 5. A *Protodendrophagus antipodes* larva. Specimens have been collected from New Zealand's Southern Alps at elevations from 1,500 m to over 2,000 m. Photo credit: John Marris.

These photographs illustrate the article “Eating at high elevation: an herbivorous beetle from alpine rock outcrops relies on ammonia-absorbing lichens” by John Marris, David Hawke, and David Glenny published in *Ecology*. <https://doi.org/10.1002/ecy.2598>